ferring especially to the Zygænidæ. It seems to us that Mr. Smith in this essay fails to take a comprehensive view of the group; his families are sub-groups, and to base families wholly on the venation is carrying matters to an extreme; the venation in this family seems to us to be mainly useful in defining genera. Mr. Smith is led to throw Endryas out of the family, whereas by its larval, pupal and head and trunk characters it is a true Zygænida, the characters Smith uses are, we think, superficial. The two closing articles of the first number of the volume are by Dr. Horn, on the North American species of Cryptobium and Studies among the Meloidæ.——Interesting notes on oviposition in Agrion and insect migration appear in the *Entomologists' Monthly Magazine* for February.——Mr. T. L. Casey's Contributions to the descriptive and systematic Coleopterology of North America contains carefully prepared and lengthy descriptions of new genera and species of American beetles which will be of permanent value. We trust that the time for sub-lined descriptions of Coleoptera has gone by.——At a meeting of the Entomological Society of London, held Feb. 4, Mr. W. L. Distant exhibited a series of wings of Indian butterflies, showing the differences between broods of the same insect in the wet and dry seasons respectively, which had hitherto been generally regarded as distinct species.——Professor Packard desires specimens of Nola and of the Notodontians, with a view to preparing a revision of these groups of Bombycidæ.—— L. R. Meyer Dür, a well known Swiss entomologist, died at Zurich, March 2d, aged 73. On November 28th, G. A. Keferstein died at Erfurt, aged 91, at the time of his death the oldest entomologist in Europe.

ZOÖLOGY.

Distribution of Color in the Animal Kingdom.—L. Camerano discusses this subject at length. Colors may be arranged in accordance with the frequency of their occurrence, thus: (1) Brown; (2) black; (3) yellow, grey and white; (4) red; (5) green; (6) blue; (7) violet. Black, brown and grey are more common in Vertebrata than in Arthropoda, while red and yellow are more generally met with in the lower forms. Green is very frequent in the lower forms, less so in Mollusca and still more rare in Vertebrata. Violet and blue are the colors most seldom met with, but they occur in all groups of the animal kingdom. White is irregularly distributed, but more characteristic of aquatic animals. The colors of animals bear a relation to the mediums in which they live; parasites are less varied in color than free-living animals. Aquatic animals are commonly more evenly and less brilliantly colored than land animals; pelagic animals, as might be predicted from their transparency, are not strikingly colored. Among birds the strongest flyers are most soberly tinted. Of inhabitants of the sea, those that live among Algæ are more vividly

colored than those which live under stones or on a sandy bottom; similarly land animals that inhabit forests are on the whole more conspicuous for their bright coloration than animals which live in deserts. There is no relation between the color of an animal and its food, as Grant Allen has asserted; insectivorous animals that live among plants and flowers have often varied and brilliant colors; on the other hand, herbivorous animals, if they do not habitually live among shrubs and herbs, are dull and uniformly colored. The development of color stands in no relation to light, but depends far more upon the condition of the animal; ill-health and insufficient food causes a diminution in the brilliancy of its coloration.

In very dry climates the colors appear to be darker, while the reverse is the case in damp climates. The various zoölogical regions of the earth are characterized by a certain dominant range of color in their inhabitants; grey, white, yellow and black characterize the animals of the palæarctic region; yellow and brown those of the Ethiopian; green and red are the prevailing tints of the neotropical; red and yellow, of the Indian region. Australia is distinguished from the rest by the great abundance of black animals.

In a given group of animals the larger species are usually more uniformly colored than the smaller. Sexual colors bear a general correspondence to the development of the animal; the males are mostly more brilliantly colored; in many cases, however, where the females are larger and stronger than the males, the former show the more brilliant coloration. Young animals are often differently colored to the adults, their colors are generally more like those of the adult female. The young of several species that are most dissimiliar in their colors, when adult are often hardly distinguishable in this respect.—*Journal of the Royal Microscopical Society, February, 1885.*

LIFE-HISTORY OF STENTOR CÆRULEUS.—Professor G. W. Worcester gives a detailed description of the development and life-history of *Stentor cæruleus*, which can hardly be satisfactorily abstracted. When first observed it appeared a motionless, intensely blue mass, containing what seemed to be a row of internal vacuoles, which later proved to be the moniliform endoplast of the mature infusorian. A larger vacuole was observed that subsequently became the mouth. The mass slowly changed its form, developing cilia at each extremity. The cilia eventually disappeared from one end, the shape was constantly varied, and in a little less than two hours it had put on the mature form, and was swimming very rapidly. Conjugation with another specimen was then observed, each fastening itself by its posterior end to some object, their backs meeting, when they would roll over each other till their anterior extremities met. Conjugation lasted some moments when the specimens separated and swam away. The individual

observed lost its bluish tint and became of a bronze color. About an hour and a half after the conjugation it stopped suddenly, assumed a flat spread-out condition, whilst at the same time large vacuoles appeared throughout its entire mass. In appearance it was amœba-like, and after a time small masses became detached and immediately assumed a globular form. The detachment of masses whilst in this amœba-like stage in other specimens was witnessed, as also their development into mature forms.

The main mass would in some instances disintegrate after portions had been detached to form new individuals, nearly all the granular mass flowing out and leaving a row of egg-like bodies, the exact nature of which the author was unable to determine; he considers, however, that in them begins the cycle of life.

In one instance the specimen under observation only partially disintegrated, "the ciliated part, and a little more," remaining intact, and subsequently reforming into a perfect individual. Reproduction by the formation of internal embryos was also observed, likewise the rarer method of fission proper.

Professor Worcester considers the primitive form to be that of a sphere, and that the series of later forms assumed are so taken on by the creature in order to adapt itself more fully to its environment. The posterior end would seem to be appended more for locomotion and for the purpose of fixing itself. Conjugation must in some way play an important part in the re-arranging of the protoplasm.—*Journal of the Royal Microscopical Society, December, 1884.*

A Nervous System in Sponges.—Dr. R. v. Lendenfeld describes the presence of nervous elements and ganglion cells in the heterocœlous sponges. In the Sycones the walls of the pores contain groups of spindle-shaped cells, mesodermal in origin, which are frequently connected with branched cells, apparently of a ganglionic nature. In the Leucones sensory cells are present, but not concentrated round the pores. They are scattered here and there in groups over the general ectodermal surface; no ganglion cells like those of Sycones were discovered. In the Ascones the ordinary ectodermic cells appear to perform also the nervous functions. These results clearly show that the calcareous sponges at least can no longer be considered as Protozoa.—*Jour. Roy. Micr. Soc., April, 1885, 253.*

Shells of Bivalves.—An investigation of the structure and development of the shells of a great number of Lamellibranchiates has led W. Müller (*Zoöl. Anzeiger,* VIII, p. 70) to distinguish two chief varieties. First, in those shells which are only here and there connected with the mantle, the organic substance of the mother-of-pearl is membranous. Second, in shells which are continuously grown to the mantle, the organic substance of the mother-of-pearl layer forms a net-work. Only Cyclas represents

the second group, the former comprises all other Lamellibranchs.

THE LATERAL LINE OF FISHES.—It is familiarly known that the name of "lateral line" has been given by ichthyologists to an organ which runs along each side of almost all fishes, extending from the head to the tail. It has been successively studied by Steno, Lorenzini, Petit, Redi, Leydig and Schulze, the latter of whom have indicated the true path to be followed for the discovery of the functions of this line, whilst they have almost completed the investigation of its anatomy.

M. de Sède, in a thesis recently maintained before the Faculty of Sciences at Paris, and reproduced in Cosmos les Mondes, gave an account of certain interesting experiments made for the purpose of elucidating the physiological functions of this curious organ.

The fishes selected for the experiment were first submitted to the action of an anæsthetic, and then underwent the operation of re-section of the lateral nerve, which excited no reflex action due to pain. When resuscitated the subjects were left at rest in a large bowl, and some days afterwards they were placed in a vast aquarium where everything is so arranged that a fish desirous of circulating freely must make use of all its tactile resources and means of guidance. Under these conditions it was observed that the fishes which had been operated upon moved only with great caution, and were almost always the last to arrive at the distribution of food. Thus it appears that a fish able to make use of its eyes, but deprived of its lateral line, experiences a certain difficulty in finding its way.

M. G. de Sède next sought to ascertain how a fish would act if it retained the use of its lateral line, but was deprived of sight.

Two perches were blinded by removal of the eye-ball. There remained to them, then, for guidance, merely the general sensibility of the integuments and the special impressionability of the lateral apparatus in question. These organs acquire in a short time a great delicacy, for the two perches, when placed in the general aquarium, were soon able so guide themselves without any difficulty.

But the question now arises as to what part of this steering power belongs to the general sensibility, and what to this lateral line? Further experiments solved this problem.

A barbel was blinded, and, by way of extra precaution, its filaments were amputated. Subsequently its lateral nerve was severed. As long as this fish—even though deprived of its eyes and beard—retained the lateral nerve it guided itself easily; but as soon as this nerve was severed, it remained persistently motionless.

Lastly, a perch, blinded and deprived of its lateral line on one

side only, was placed in the labyrinthine aquarium. It contrived to keep the non-mutilated side turned towards any obstacle.

These experiments leave no doubt as to the function of the lateral line. It is a very delicate organ of touch, adapted to the requirements of an aquatic life. It is sensitive to the faintest movement of the water, takes cognizance of the slightest displacements, and gives fishes continual information on the state of the medium in which they live.

ZOOLOGICAL NEWS.—*Vermes.*—Mr. W. Bateson has contributed to the *Quart. Jour. Micros. Sci.*, an account of the early stages of the development of examples of Balanoglossus found at Hampton, Va. The adults agree very closely with *B. kowalevskii* of Agassiz, but as the development differs, the species cannot be identified. At no stage has the larva any superficial resemblance whatever to a Tornaria, such as is described by Agassiz as occurring in the development of *B. kowalevskii.* The eggs are elliptical and opaque, are fertilized outside of the body; divide into two, segment regularly and then form a hollow blastophore, enclosing a segmentation cavity. The gastrula is formed by invagination, the blastopore closes completely, a posterior transverse ring of cilia forms, and the body elongates and becomes marked out into regions. The mouth is a small pore in the ventral middle line of the anterior transverse groove; and the nervous system is formed by a segregation of epiblastic cells in the dorsal middle line of the collar, forming a cord lying immediately beneath the skin. The larva is always opaque, and creeps about in the muddy sand when hatched.

Cœlenterates.—According to R. von Lendenfeld, the *Crambessa mosaica* in Port Jackson is brown, while that of Port Philip is deep blue. The difference is caused by the presence of Zoanthellæ, parasitic algæ which may possibly be young stages of Laminarians, in the Sydney variety, which Mr. Lendenfeld names *Crambessa mosaica symbiotica*, because it has become associated symbiotically with an alga, and thus differs from the Melbourne form as lichens differ from fungi. Should the variety not be able to live without its parasite, it would be a new species. Huxley, in 1845, does not notice the brown color, and all previous authors, though they have collected the species near Sydney, describe it as varying in color from blue to gray. Our author asks whether the change has taken place since 1845?

Batrachians and Reptiles.—Professor E. D. Cope as one of the results of his studies on the batrachian and reptilian fauna of Mexico and Central America, which had been prosecuted by the use of material mainly placed at his disposal by the Smithsonian Institution, states that the total number of species described up to date is six hundred and ten, which is described as follows:

		Genera.	*Species.*	
Batrachia	Urodela	6	15	120
	Gymnophiona	4	7	
	Anura	31	98	
Reptilia	Crocodilia	2	3	489
	Testudinata	11	28	
	Lacertilia	42	184	
	Ophidia	92	274	

Mammals.—Dr. A. Günther (*Ann. and Mag. Nat. Hist.*, Dec., 1884), describes *Alcelaphus cokii*, a hartebeest, killed by Col. Coke, on the east coast of Africa, and *Gazella thomsoni*, from frontlets brought home by Mr. J. Thomson, from his recent trip to Mt. Kenia and Victoria Nyanza. Mr. Thomson also brought back a frontlet of *A. cokii*. Thomson's gazelle is marked with a distinct black lateral band, which is absent in the allied *G. grantii*, with which it does not mingle.——Mr. Caldwell writes that Platypus embryos are quite easy to get and he cannot understand why they were not obtained before. He has thirty blacks with him and they have found 500 Echidna in six weeks.——From a study of the cerebral convolutions of the Carnivora and Pinnepedia, Professor St. Geo. Mivart gives additional reasons for the threefold division of the forms into Cynoidea, Æluroidea and Arctoidea. In a paper recently read before the Linnean Society, he called attention to the universal tendency among the Arctoidea to the definition of a distinct and conspicuous lozenge-shaped patch of brain substance defined by the crucial and pre-crucial sulci. This condition does not occur in any non-Arctoid carnivore, but is found in *Otaria gillespii* and *Phoca vitulina*, where it is small and much hidden. He adduced this fact as an important argument in favor of the view that the Pinnipedia were evolved from some Arctoid, probably Ursine, form of land carnivore. The brains of Naudinia, Galidia, Crytoprocta, Bassaricyon, Mellivora, Galictis and Grisonia, were for the first time described in detail. The Viverrina, judged by the cerebral characters, formed a very distinct group among the Æluroids.

EMBRYOLOGY.[1]

On the Formation of the Embryonic Axis of the Teleostean Embryo by the Concrescence of the Rim of the Blastoderm.—During the season of 1881, I had an opportunity to study part of the developmental history of *Elacate canadus* at Cherrystone, Virginia. But unfortunately the lot of ova investigated by me did not develop to the period of hatching, but only passed a little beyond the stage when the blastoderm closes. As I have referred elsewhere to the very remarkable condition of affairs observed by me just previous to the closure of the blastoderm in this species, and not being likely to soon again have an opportunity to study the same form, I will now describe and figure what

[1] Edited by John A. Ryder, Smithsonian Institution, Washington, D. C.